

Amendments to the Specification

*Please replace paragraphs [0051] to [0053] with the following amended paragraphs:*

**[0051]** Preferably, the resistive band 140 extends continuously along the perimeter of the touch region 130. The electrodes 135 are suitably electrically coupled to the substrate 125 at the corners of the resistive band 140. In this manner, the resistive band 140 is functionally divided by the electrodes 135 into four band segments 145a-d (left, right, top, and bottom), each of which is continuous and borders one side of the rectangular touch region 130. Further details regarding the use of conductive bands of intermediate resistivity are described in U.S. Patent Application Ser. No. 09/262,909, now U.S. Patent No. 6,650,319, which is expressly incorporated herein by reference. As will be described in further detail below, the resistive band 140 has additional unique qualities that operate to further reduce the poor-crossing problem.

**[0052]** In accordance with typical 5-wire architectures, x- and y-exitations are alternately applied to the touchscreen substrate 125 via the electrodes 135. Specifically, an x-excitation is generated by passing current through the touch region 130 injected at the right band segment 145b and collected at the left band segment 145a. As a result, a voltage gradient is generally created along the x-axis (similar to that shown in **Fig. 2a**). A y-excitation is generated by passing current through the touch region 130 injected at the top band segment 145c and collected at the bottom band segment 145d. As a result, a voltage gradient is generally created along the y-axis (similar to that shown in **Fig. 2b**). Although the controller electronics 110 can obtain touch information from a 5-wire resistive touchscreen via the voltage excitation described above, current injection can also be used with similar results. Further details regarding 5-wire resistive touchscreens are found in U.S. Patent Nos. 4,220,815, 4,661,655, 4,731,508, 4,822,957, 5,045,644, and 5,220,136. The touchscreen system 100 can alternatively employ a 9-wire or capacitive architecture. These and other technologies are described in U.S. Patent Application Ser. No. 09/705,383, now U.S. Patent No. 6,593,916, which is expressly incorporated herein by reference.

**[0053]** The controller electronics 110 can map the non-linear equipotential space onto the Cartesian space in any one of a variety of manners. For example, it can be shown that two polynomials can be constructed to accurately map intersections of the equipotentials to unique coordinates. Given two potentials (v and w), measured as previously described, the following mapping polynomials can be used to transform a potential pair [v(x,y), w(x,y)] into Cartesian coordinates x and y:  $x(v, w) = \sum_k A_k v^k w^{m_k}$ ;  $y(v, w) = \sum_k B_k v^{m_k} w^k$ , where the sum is

taken over all the terms  $k$  of the polynomials with coefficients  $A_k$  and  $B_k$ . The degree of the polynomials for a specified accuracy is dependent upon the uniformity of the equipotential distributions. Alternatively, a look-up-table (LUT) that stores a large array of pre-defined  $x,y$  points corresponding to the field of points in the  $[v(x,y), w(x,y)]$  can be employed. More alternatively, interpolative mapping can be used. Further details regarding these and other mapping techniques are disclosed in U.S. Patent Application Ser. No. 09/262,909, now U.S. Patent No. 6,650,319.

*Please replace paragraph [0068] with the following amended paragraph:*

**[0068]** The significance of having a quasi-continuous band in a touchscreen is that the edges of the workable touch region will be spaced from the resistive band a very small distance, roughly equal to the periodic spacing ( $d_1 + d_3$ ) between conductive elements or perhaps 1 mm, thereby providing a greater workable touch region as compared to a dimensionally equivalent touchscreen with discrete peripheral resistors. Of course, the use of a continuous resistive band, such as the resistive bands used by the previously described touchscreens 105 and 205, as well as the touchscreens described in U.S. Patent Application Ser. No. 09/262,909, now U.S. Patent No. 6,650,319, will result in a touchscreen with a workable touch region that extends all the way to the resistive band, providing a maximized touch region.

*Please replace paragraph [0072] with the following amended paragraph:*

**[0072]** It should be noted that, for touchscreens in which very narrow borders are desired, a low resistance ratio  $\beta$  may be difficult to achieve by applying the conductive elements onto the material from which the resistive substrate is composed, since the fractional width  $f$  of the conductive elements would approach unity, thus making the precise control of the resistance difficult. In this case, the resistive band can be further composed of a continuous material having an intermediate resistivity between that of the electrodes and the touch region—similar to the resistive band 140 illustrated in the touchscreen 105, as well as the resistive bands described in U.S. Patent Application Ser. No. 09/262,909, now U.S. Patent No. 6,650,319. The provision of the underlying intermediate resistive material thus allows the fractional width  $f$  of the conductive elements to be lowered, e.g., to a value within the range from 0.2 to 0.8.

*Please replace paragraph [0089] with the following amended paragraph:*

**[0089]** Computer simulations have shown that common types of material and manufacturing variances can be defined and that mapping parameters can be customized to

the current touchscreen properties. Measurements can be manually or automatically performed to provide information about the nature and extent of variances from nominal touchscreen performance. For example, by applying various voltages to the electrodes using the controller electronics, measurements of current flowing to those electrodes or of the potential measured on unbiased electrodes can be made. Additionally, touches at known positions could also supply information. These measurements can then be used to generate corrections to the nominal mapping algorithms. Significantly, the use of non-uniform resistive bands can simplify this correction processing by reducing the number of terms in the case of polynomial mapping, or reducing the number of points in an LUT if that is used to provide mapping capability. Further details regarding dynamic correction techniques are disclosed in U.S. Patent Application Ser. No. 10/246,059, published as U.S. Publication No. 2004/0061687, which is expressly incorporated herein by reference.